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Tetsunori Itabashi

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EXAMINER

SAUNDERS JR, JOSEPH

ART UNIT

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2614

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/532,546	Applicant(s) ITABASHI ET AL.	
	Examiner Joseph Saunders	Art Unit 2614	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 June 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 7-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 April 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to the communications filed June 5, 2009.

Claims 7 – 9 are currently pending and considered below.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 7 – 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bienek et al. (WO 02/078388 A2), hereinafter Bienek, in view of Kunugi et al. (US 4,868,878), hereinafter Kunugi.

Claim 7: Bienek discloses a reproducing apparatus for reproducing an audio signal (apparatus to create a sound field), comprising:

a first plurality of digital filters (delay means 1508 or adjustable digital filter can also be arranged to apply delays) each supplied with an audio signal (input signal 101);

a second plurality of digital filters (adjustable digital filter means 1512) each supplied with the audio signal (input signal 101);

a speaker array (DPAA) in a configuration in which plurality of speakers (output transducers 104) are arranged, in which signals representative of outputs

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of the first plurality digital filters are delivered to the respective plurality of speakers to form a sound field (Figure 7C and Figure 8);

in which predetermined delay times are set at the first plurality of digital filters so that respective propagation times required until the audio signal arrives at a first point within the sound field through the first plurality of digital filters and the respective plurality of speakers coincide with each other (Figure 7C and Figure 8), and

in which predetermined transfer characteristics (coefficients and Figures 11A – 11D) are set at the second plurality of digital filters to control sound at a second point within the sound field among sounds formed from outputs of the first plurality of digital filters (Figure 7C and Figure 8) (Bienek teaches that “one or the other of the signal delay means (1508) and adjustable digital filter (1512) may also be dispensed with,” Page 18 Lines 15 – 30. Bienek further teaches that the outputs of multiple Distributors can be combined by adders before reaching the DPAA, Figure 15. Therefore one of the Distributors in Figure 15 could be configured as taught by Bienek to include only signal delay means (1508) and the other configured to include only adjustable digital filter means (1512). The outputs of each distributor are then combined through the use of adders and provided to the same speaker array resulting in for example Figure 8 where sound is directed in directions (B1), (B2), and (B3).).

Bienek does not disclose a plurality of subtraction circuits respectively supplied with the outputs of the first plurality of digital filters and outputs of the second plurality of digital filters and operable to perform respective subtraction

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operations therebetween, in which signals representative of outputs of the plurality of subtraction circuits are respectively delivered to the plurality of speakers,

in which predetermined transfer characteristics are set at the second plurality of digital filters to control sound at a second point within the sound field among sounds formed from outputs of the first plurality of digital filters so as to cause a canceling sound wave to be produced,

wherein (i) a channel signal for forming at least a portion of the audio signal that arrives at the first point and (ii) a leakage cancelling signal for forming at least a portion of the cancelling sound wave are supplied to and reproduced by the same speaker.

Bienek does disclose reducing “side lobes” of the sound beams by providing a window function to improve directivity. Kunugi teaches another method than just reducing “side lobes” or “leakage” it eliminates the unintended sound wave at the listening point in the sound field. Kunugi explains, “In accordance with the above and other objects, the invention provides a sound field correcting system in which, in order to eliminate the effects of reflected sound waves in the sound field, the original signal is added to a signal which is obtained by varying the characteristic of the original signal to form a loudspeaker driving signal, thereby to make the frequency characteristic of the composite sound signal received at the listening point essentially flat. More specifically, in a sound field correcting system of the invention, a signal obtained by adjusting the level and delay of the original signal is superposed on the original signal to obtain

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a signal for driving the loudspeaker, thereby to eliminate the effect of the reflected sound wave at the listening point in the sound field," Column 3 Lines 41 – 55. Kunugi teaches implementing the sound field correcting system using a circuit as shown for example Figures 7, 9, and 12 making note of the inverter or subtraction operation. (See also Response to Arguments below now incorporated into the rejection for further clarification).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the circuit of Bienek , as taught by Kunugi, to add to the original channel signal a signal obtained by varying the characteristics of the original channel signal to form a loudspeaker driver signal, thereby eliminating the unintended sound components responsible for excess reverberation, poor channel separation, and irregular frequency characteristics (Kunugi Column 3 Lines 16 - 31), the elimination resulting in improved directionality of the surround signal in the system of Bienek.

Claim 8: Bienek and Kunugi disclose the reproducing apparatus for reproducing an audio signal as set forth in claim 7, and Bienek further discloses wherein a primary sound wave ((B2) or (B3)) resulting from the channel signal ("B2 represents a right surround (right rear speaker in a conventional systems) sound channel and beam B3 represents a left sound channel," Page 24 Lines 10 – 15) supplied to the speaker is reflected on a wall surface, and arrives at the first point ((X), Figure 8).

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Claim 9: Bienek and Kunugi disclose the reproducing apparatus for reproducing an audio signal as set forth in claim 8, and Bienek further discloses wherein the second point is at substantially the same location as the first point (The different sound beams (B1), (B2), and (B3) are all directed to substantially the same point of the listener (X), Figure 8).

Response to Arguments

4. Applicant's arguments filed June 5, 2009 have been fully considered but they are not persuasive. After reading Applicant's arguments it is believed that Applicant is confused as to the teachings of Kunugi. Applicant argues on page 6, "That is, the loudspeaker driving signal does not include the components of the original signal that would otherwise cause the loudspeaker to produce such reflected sound wave. See Id. Applicants submit, however, Kunugi fails to disclose, teach and/or suggest that the loudspeaker driving signal causes the loudspeaker to produce either the reflected sound wave or a sound wave to cancel the reflected sound wave, much less, both," however, clearly indicated in Figure 6, from which Applicants remarks are derived, is illustrated two signal paths one responsible for the direct sound or "original signal" which also causes the reflected sound (1-7 and 1-8 of Figure 2 respectfully) and a second signal path which contains delay 1-9, level adjust 1-10, and the inverter 1-11 responsible for essentially eliminating the effects of the reflected wave when summed with the original signal via adder 1-14 and out as a loudspeaker driving signal. Therefore, Kunugi teaches as amended "(i) the channel signal is adapted to form at least a portion of the audio signal that arrives as the first point, (ii) the leakage canceling signal is adapted to form at least a portion of the canceling sound wave, and (iii) both of the channel

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signal and leakage canceling signal are supplied to and reproduced by the same speaker," where the direct sound or original signal path which also causes the reflected sound (also taught by Bienek with regards to Figure 7C and Figure 8 and "side lobes" or "leakage") corresponds to (i) and the second signal path including delay 1-9, level adjust 1-10, and the inverter 1-11 corresponds to (ii) and both the paths are summed via adder 1-14 therefore teaching (iii).

5. Further, while Applicant states, "Thus, Kunugi teaches producing directional sound waves that are compensated so as not to include the components of the original signal that would otherwise cause the loudspeaker to produce undesired reflected sound waves," it is the Examiner's belief that again as stated above the Applicant is misunderstood in that Kunugi does include the components of the original signal and also contains components to cancel the delayed or reflected version of the original, as such the loudspeaker of Kunugi still produces undesired reflections however the second signal path aims to eliminate the reflections. See also Column 7 Lines 25 – 45 of Kunugi which states, "FIGS. 8A and 8B show sound pressure characteristics at a listening point in a vehicle sound field in such a case. FIG. 8A indicates sound pressure characteristics in the case where the lengths L_n of the sound paths are substantially equal to one another ($L_2 \approx L_3 \approx L_4 \approx L_5$), and FIG. 8B indicates a synthetic sound pressure characteristic formed by all reflected sound waves at the listening point. In the latter case, compensation is made for the reflected sound waves as described above traveling along the path L_2 , for instance, and then the delay time is corrected. As is apparent from the above description, in the sound field correcting system according to this embodiment of the invention, a

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signal obtained by varying the frequency characteristic of the original signal so that the reflected sound waves are eliminated at the listening point is added to the original signal to obtain the loudspeaker driving signal. Therefore, the frequency characteristic at the listening point can be made essentially flat. Furthermore, the system is simple both in the adjustment required and in its construction, and it can be manufactured at a relatively low cost," and again stated slightly differently by Kunugi in Column 10 Line 65 - Column 11 Lines 8, "As mentioned above, when, in order to eliminate the reflected wave, a signal equal in level thereto and different by 180° in phase therefrom at the listening point is applied to the loudspeaker, the signal is reflected from a wall, etc., to produce a reflected wave. Therefore, a signal which is equal in level to and different by 180° in phase from the reflected wave is applied to the loudspeaker. If this operation is repeatedly carried out, the reflected wave level will gradually be decreased to a value which can be disregarded".

6. Therefore, it is believed that all of Applicant's arguments have been addressed, the rejection deemed proper, and thus, the rejection is maintained.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Saunders whose telephone number is (571) 270-1063. The examiner can normally be reached on Monday - Thursday, 9:00 a.m. - 4:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curtis Kuntz can be reached on (571) 272-7499. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. S./

Examiner, Art Unit 2614

/CURTIS KUNTZ/

Supervisory Patent Examiner, Art Unit 2614